

## Exercise 1.1

Q1 One card is selected at random from a standard pack of 52 playing cards. Find the probability of selecting each of the following:

- a) the 7 of diamonds                      b) the queen of spades
- c) a 9 of any suit                          d) a heart or a diamond

**Q1 Hint:** A pack of cards is split into 4 suits — hearts, diamonds, spades and clubs.

Q2 The following sample-space diagram represents a dice game where two dice are rolled and the product of the two scores is calculated:

×	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	18
4	4	8	12	16	20	24
5	5	10	15	20	25	30
6	6	12	18	24	30	36

- a) Find the probability that the product is a prime number.
- b) Find the probability that the product is less than 7.
- c) Find the probability that the product is a multiple of 10.

Q3 A game involves picking a card at random from 10 cards, numbered 1 to 10, and tossing a coin.

- a) Draw a sample-space diagram to show all the possible outcomes.
- b) Find the probability that the card selected shows an even number and the coin shows 'tails'.

Q4 Martha rolls two fair six-sided dice and calculates a score by subtracting the smaller result from the larger.

- a) Draw a sample-space diagram to show all the possible outcomes.
- b) Find  $P(\text{the score is zero})$ .
- c) Find  $P(\text{the score is greater than 5})$ .
- d) What is the most likely score? And what is its probability?

Q5 Spinner 1 has five equal sections, labelled 2, 3, 5, 7 and 11, and spinner 2 has five equal sections, labelled 2, 4, 6, 8 and 10.

If each spinner is spun once, find the probability that the number on spinner 2 is greater than the number on spinner 1.

**Q1 Hint:** You're given probabilities, rather than numbers of outcomes for each event, so label your diagram with probabilities.

## Exercise 2.1

Q1 For events A and B,  $P(A) = 0.4$ ,  $P(B) = 0.5$  and  $P(A \text{ and } B) = 0.15$ .

- a) Draw a Venn diagram to represent events A and B.
- b) What is  $P(\text{neither A nor B})$ ?

Q2 Rich only ever buys two brands of tea, 'BC Tops' and 'Cumbria Tea', and two brands of coffee, 'Nenco' and 'Yescafé'. On his weekly shopping trip, Rich buys either one brand of tea or no tea, and either one brand of coffee, or no coffee.

- a) Copy and complete the two-way table below, which shows the probabilities for each combination of tea and coffee Rich might buy in any one week.

	BC Tops	Cumbria	No tea	Total
Nenco	0.16	0.07		
Yescafé	0.11			0.18
No coffee		0.12	0.14	
Total	0.51		0.27	1

- b) Find the probability that, on any given shopping trip:

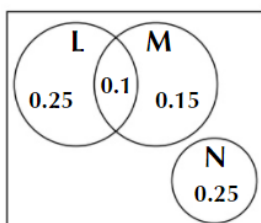
- Rich buys Cumbria Tea and Yescafé,
- Rich buys coffee,
- Rich buys tea but no coffee.

Q3 A sixth form college has 144 students. 46 of the students study maths, 38 study physics and 19 study both.

- Represent the information given above using a two-way table.
- Find the probability that a randomly selected student from the college studies at least one of either maths or physics.
- What is the probability that a randomly chosen maths student also studies physics?

Q4 Use the Venn diagram to find the following probabilities:

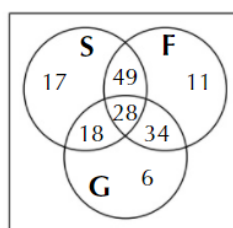
- $P(L \text{ and } M)$
- $P(L \text{ and } N)$
- $P(N \text{ and not } L)$
- $P(\text{neither } L \text{ nor } M \text{ nor } N)$
- $P(L \text{ or } M)$
- $P(\text{not } M)$



Q5 Two hundred people were asked which of Spain, France and Germany they have visited. The results are shown in the diagram.

Find the probability that a randomly selected person has been to:

- none of the three countries
- Germany, given that they have been to France
- Spain, but not France



Q6 1000 football supporters were asked if they go to home league matches, away league matches, or cup matches. 560 go to home matches, 420 go to away matches, and 120 go to cup matches. 240 go to home and away matches, 80 go to home and cup matches, and 60 go to away and cup matches. 40 go to all 3 types of match.

Find the probability that a randomly selected supporter goes to:

- exactly two types of match
- at least one type of match

**Q2 Hint:** In a two-way table, the totals of the rows and the totals of the columns should each add up to the number in the bottom right-hand cell of the table.

**Q3 Hint:** Draw the table and fill in the numbers given in the question — you should then be able to work out all the missing numbers.

**Q4 Hint:** If two circles don't overlap, it means the events can't both happen.

**Q5b) Hint:** The total number of people you're interested in here is just the number who have been to France.

